بسم الله الرحمن الرحيم

In The Name Of ALLAH

The Most Gracious, The Most Merciful

Armed Forces College of Medicine

AFCM

Drugs used to treat bronchial asthma and COPD (3)

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INTENDED LEARNING OBJECTIVES (ILO)

Lecture 3:

1. Explain the mechanism of action of mast cell stabilizers and their role in long term control of bronchial asthma.
2. Identify new drugs used in treatment of bronchial asthma.
3. List drugs used in treatment of chronic obstructive pulmonary disease.
4. Identify the different types of cough therapy

Mast Cell Stabilizers

(Cromolyn and Nedocromil)

Prophylactic anti-inflammatory agent
(Reduce bronchial hyper-reactivity)

- They have **no effect on smooth muscle tone**

Poorly absorbed from gut and so are **given by inhalation**

using either

solutions (nebulizer) or **powdered drug**

(delivered by spinhaler)

Short duration of action: 3 – 4 times daily

Mechanism of action:

Inhibit mast cell degranulation by stabilizing the mast cell membrane (altering the permeability of Cl)

 Release of allergic mediators from mast cells

Clinical uses:

Nedocromil and Cromolyn

- ✓ used as **inhaler**
- ✓ a ***trial of 4 weeks is carried out to determine response.***
- ✓ They may be ***added to standard dose of corticosteroids*** to improve asthma control.
- ✓ Used also as a **nasal spray in allergic**

New Drugs

Omalizumab

Anti-IgE Monoclonal Antibodies:

- binds IgE & prevents its binding to IgE receptors on mast cells
  - inhibits degranulation of mast cells and prevents the release of allergic mediators from them.

- In patients with **moderate to severe persistant asthma**
  not controlled by both inhaled corticosteroids and long acting β_2 agonists.

- **Its use is limited by:**
  - **High cost**

A 10-year-old female with allergy-induced asthma is treated with cromolyn. What is the mechanism of action of cromolyn?

a. Inhibition of airway muscarinic receptors
b. Inhibition of 5-lipoxygenase
c. Inhibition of mast cell degranulation
d. Inhibition of phosphodiesterase
e. Activation of β-adrenergic receptors

Cough Therapy

Cough is a protective mechanism to expel
secretions
foreign bodies outside the respiratory tract &

Types of cough

Non productive (dry) cough **productive cough**

Treated by

Anti-tussives

Expectorants + Mucolytic

Treatment of dry cough

Anti-tussives

Central anti-tussives

Inhibit medullary cough center

1- Narcotic addictive: as morphin, methadone, heroin.XX

2- Narcotic relatively non addictive e.g., Codeine

3- Non- narcotic Non addictive as: Dextromethorphan in chronic cough.

Peripheral Antitussives

Antitussives acting peripherally

Demulcents: **in pharyngitis and sore throat** e.g. ***liquorice*** (pastilles-lozenges-syrup).

Steam inhalation: **in tracheobronchitis**

e.g. ***menthol*** in a dose 1 tea spoonful added to 500 ml of boiling water.

Action: It promotes secretion of protective mucus.

Treatment of productive cough

Mucolytic

Mucolytic agents

- **Breakdown mucous** They liquefy viscid secretion
so enhance the efficacy of the expectorant.

1) Bromhexine

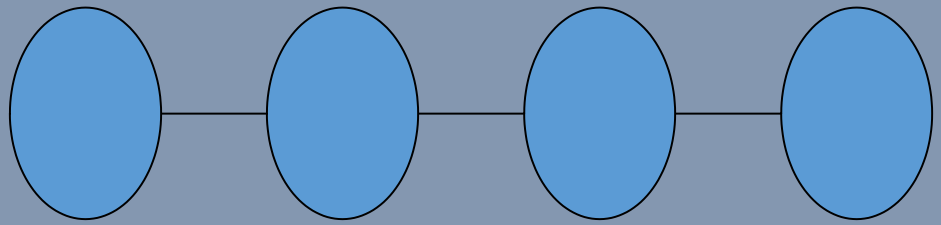
2) Acetyl-cysteine

Bromhexine &

Ambroxol (active metabolite of Bromhexine):

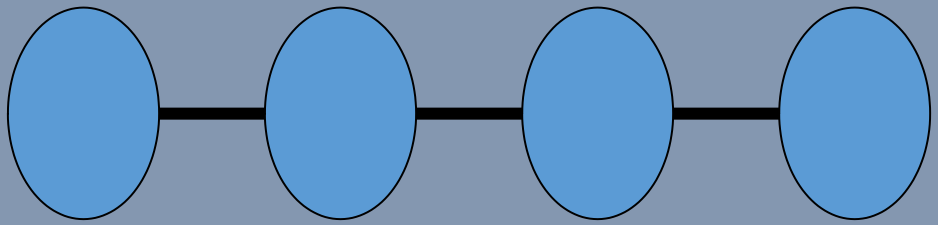
Causes **depolymerization of mucopolysacchar**

of ground substance of sputum. So liquefy the sputum.



Acetylcysteine

It splits disulfide bonds that hold the mucous material



Acetylcysteine

Indications:

1) **adjuvant therapy in acute and chronic pulmonary disease (TB ,cystic fibrosis, pneumonia)**

It splits disulfide bonds that hold the mucous material

2) **Diagnostic bronchial studies (to clear the airway)**

- **In acetaminophen toxicity antidote:**

Acetylcysteine

protects liver cells from being damaged by acetaminophen as **it normalizes hepatic glutathione levels & binds with a reactive hepatotoxic metabolite of**

Drugs used in chronic obstructive pulmonary disease (COPD)

- **Chronic, irreversible obstruction of airflow**
- **Inhaled bronchodilators are the main drugs: anticholinergic and β2 agonists as single drugs or in combination**
- **LABA (salmeterol) + LAMA (tiotropium)**
- **Inhaled steroids is restricted to patients with severe disease (FEV1 < 60%)**

- Which of the following is a prodrug and act as a mucolytic?

a) Omalizumab
b) Bromhexine
c) Dextromethorphan
d) Acetylcysteine
e) Ambroxol

Key Point Summary

Cromolyn and Nedocromil:

- ***Mast cell stabilizer***
- Used by inhaler
- They may be **added to standard dose of corticosteroids** to improve asthma control.

Omalizumab:

- Anti-IgE Monoclonal Antibodies
- Given by SC injection every 2-4 weeks
- Used in moderate to severe persistant asthma not controlled

Drugs in Cough :

- Antitussives (Dextromethorphan)
- Mucolytics : Bromhexine, Ambroxol and Acetylcystein

Treatment of COPD :

- Inhaled bronchodilators are the main drugs
- Inhaled steroids is restricted to patients with severe disease

SUGGESTED TEXTBOOKS

1. Whalen, K., Finkel, R., & Panavelil, T. A. (2018) Lippincott's Illustrated Reviews: Pharmacology (7th edition.). Philadelphia: Wolters Kluwer

2. Katzung BG, Trevor AJ. (2018). Basic & Clinical Pharmacology (14th edition) New York: McGraw-Hill Medical.


Thank You